

THE NATIONAL CAVE AND KARST RESEARCH INSTITUTE
DEVELOPING THE VISION

Background information compiled by the National Cave and Karst Research Institute staff
National Park Service, Geologic Resources Division
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I. INTRODUCTION

When Congress established the National Cave and Karst Research Institute (the Institute) in January 1998, it provided the cave and karst community with an unprecedented opportunity to further research, education, information transfer, and resource management revolving around these important but fragile landscapes. The Institute's legislation offers the opportunity to develop a unique style of national effort with a broad base of both federal and non-federal support extending from collaborative projects to shared administrative responsibilities to matching funds.

The Institute plans a *vision-building* workshop in Shepherdstown, WV, on October 5th and 6th, as our next step in this process. The meeting, similar to a federal agency *scoping session*, will include a small (~20), but diverse group of representatives from governmental, non-profit, and academic cave and karst programs across the United States. This document provides information for workshop participants and others interested in better understanding the challenges and processes involved in establishing the Institute.

II. OVERVIEW

A. PRE-INSTITUTE ENABLING ACT HISTORY

Congress passed the landmark Federal Cave Resources Protection Act of 1988 (Appendix A), creating a major impetus for America's involvement in cave and karst protection and management. This Act directed the Secretaries of the Interior and Agriculture to inventory and list significant caves on federal lands and provided for the management and dissemination of information about caves.

In 1990, Congress passed Public Law 101-578 (Appendix B), directing the Secretary of the Interior, through the Director of the National Park Service (NPS), to establish and administer a Cave Research Program and prepare a proposal for Congress that examined the feasibility of a centralized National Cave and Karst Research Institute. The Secretary sent the National Cave and Karst Research Institute Study Report to Congress in December 1994 (see http://www2.nature.nps.gov/nckri/exec_sum.htm or Appendix C). The study suggested skeletal organizational and operational plans for the Institute.

The 1994 Report made the key recommendation that the NPS and another entity, probably academic in nature, should jointly administer the Institute. The Report identified the NPS as the appropriate project lead because it managed 59 park units containing significant cave resources and already had a Cave and Karst Program in place. The Report noted that the NPS would have ultimate responsibility for the Institute and would retain indirect control over its activities and programs, while the academic entity/managing partner would plan, coordinate, and administer the Institute and its programs. The Report also identified the Carlsbad Caverns National Park region as the primary location, although other locations were considered.

B. THE NATIONAL CAVE AND KARST RESEARCH ACT OF 1998

Congress passed the National Cave and Karst Research Institute Act of 1998 (the Act, see <http://www2.nature.nps.gov/nckri/legislat.htm> or Appendix D), generally following the recommendations of the 1994 Report. In the Act, Congress stated that the purposes of the Institute are:

1. to further the science of speleology;
2. to centralize and standardize speleological information;
3. to foster interdisciplinary cooperation in cave and karst research programs;
4. to promote public education;
5. to promote national and international cooperation in protecting the environment for the benefit of cave and karst landforms; and
6. to promote and develop environmentally sound and sustainable resource management practices.

The Act directs the Secretary of the Interior to act through the National Park Service to create the Institute. It designated Carlsbad, New Mexico, as the home for the Institute and also stated that the Institute could either lease or build a suitable facility. Although the NPS would establish the Institute, Congress directed that the Institute be jointly administered by the NPS and a private or public partner and operated in accordance with the 1994 Report to Congress. A key “matching funds” provision was inserted by Congress, directing that the Secretary of the Interior may spend federal funds for the Institute only to the extent that they are matched by an equal amount from non-federal sources. The Institute may accept grants from private persons and transfers of funds from other federal agencies. However, the current interpretation of the legislation requires that funds provided by other federal agencies (i.e., USGS, USDA, EPA, NSF, etc.) must be equally matched by non-federal funds.

C. INITIAL DEVELOPMENT PHASE

The NPS assigned responsibility for implementing the Act jointly to the Intermountain Regional Office and the Geologic Resources Division, a national office. An initial challenge was that while the Act provided authority, Congress did not appropriate any funding for the Institute at that time. In July 2000, the Geologic Resources Division hired Interim Director Zelda Chapman Bailey to begin developing the Institute by defining the scope of operations, forming initial partnerships, securing both federal and non-federal funding, and developing proposed organizational structures and plans for a physical facility. As part of this initial effort, NPS established the National Cave and Karst Research Institute Federal Working Group (Working Group) composed of experts in cave and karst land management representing six federal agencies. The Working Group met twice a year from December 2000 through February 2003. During those two years, it provided guidance to the Interim Director and worked on a wide range of issues ranging from the Institute’s mission and goals to building requirements, funding sources, and research priorities. The Working Group also looked at the Institute’s possible organizational structure and management issues.

The Interim Director and the Working Group created an incipient grant program, utilizing NPS project funding, and provided financial support to several projects during the Institute’s Initial Development Phase. These projects include:

- Collaboration with Karst Waters Institute to produce a booklet *Guidelines for Cave and Karst Management for America’s Protected Lands*;
- Collaboration with U.S. Geological Survey to produce a USGS Circular (a magazine-style publication) on cave and karst science and management in the United States;

- Collaboration with USGS, other federal agencies, and university, state, and private groups to produce national and local karst maps and to make the integrated information available through an interactive website;
- Sponsoring publication of three cave-related books with the Denver Museum of Nature and Science, National Speleological Society, and Boston University;
- Printing the American Cave Conservation Association *Exploring Caves and Karst Curriculum Guide* for their use and to support National Cave Association programs;
- Supporting Western Kentucky University projects to investigate bacterial DNA fragment profiles in cave sediments, and support for a masters degree program tailored to working resource managers.

The Interim Director's position tenure ended in April 2003. In December 2002, the National Park Service hired Dr. Louise Hose as the Institute's Director.

D. CURRENT ORGANIZATIONAL STRUCTURE

1. INSTITUTE'S RELATIONSHIP WITH THE GEOLOGIC RESOURCES DIVISION

The Institute has resided within the NPS's Geologic Resources Division (GRD) since specific Federal base funding was obtained. GRD, a national service center located in Lakewood, Colorado, has also incorporated the NPS's Cave and Karst Program since 1995. Along with providing an organizational home, GRD staff members assist the Institute by providing guidance on regulation and policy issues, accounting and budget management, liaison in Washington, D.C., and other forms of general support.

2. CURRENT INSTITUTE STAFF

<u>TITLE</u>	<u>NAME/AFFILIATION/(LOCATION)</u>
Director	Louise Hose/NPS-GRD Full-time/(Carlsbad)
Administrative Support	Roger Scott/NPS-GRD Detail-term/(Carlsbad)
Chief Scientist	<i>Contracted with NMT, search underway/(Carlsbad)</i>
Hydrologist affiliate	Lewis Land/NM Tech/(Carlsbad)
Biologist affiliate/Liaison to the Institute	Penelope Boston/NM Tech/(Socorro)
NPS Lead	Dave Shaver/Chief, GRD/(Denver)
NPS support	Ron Kerbo/Resource Specialist, GRD/(Denver)
NPS support	Ed Kassman/Regs. Specialist, GRD/(Denver)
NPS support	Diana Diedrichs/Program Analyst, GRD/(Denver)
NPS support	Lindsay McClelland/D.C. Liaison, GRD/(Denver)
NPS support	Lindy Allen/Secretary, GRD/(Denver)

3. THE PRIMARY PARTNERS

The National Park Service, the City of Carlsbad, and the New Mexico Institute of Mining and Technology (New Mexico Tech) signed a Memorandum of Understanding (MOU) in February 2003 to facilitate the development and management of the Institute (see <http://www2.nature.nps.gov/nckri/mou.htm> or Appendix E).

CITY OF CARLSBAD

Carlsbad is mainly involved with the funding, design, and construction of the Institute's Headquarters building. City leaders see the Institute as another attraction to bring visitors to

the area. The City provided major support towards legislatively establishing and funding the Institute and cares about its future. However, City leaders express no interest in managing the day-to day operations of the Institute.

NATIONAL PARK SERVICE

The NPS has a major stake in the Institute and will jointly administer it with another public/private/academic partner. The Geologic Resources Division supports the Institute with staff and other resources. An annual base of ~\$350,000 (matching the New Mexico annual funding) now constitutes a line item within the NPS budget. The NPS currently serves as sole administrator of the Institute in consultation with the other primary partners.

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

Funding (~\$350,000) from the State of New Mexico currently passes to New Mexico Tech to develop cave and karst programs in support of the Institute. Tech has also expressed strong interest in participating with the NPS in the joint administration of the Institute. Tech currently has two research scientists assigned to assist the Institute: Dr. Penelope J. Boston, who is developing a cave and karst graduate program and serves as Tech's liaison to the Institute, and Dr. Lewis Land, a karst hydrologist.

E. BUDGET

1. Federal FY2001

- NPS provided a total of \$150,000 for start-up efforts by an Interim Director;
- Mid-year, the State of New Mexico appropriated \$350,000 to New Mexico Tech that started 7/1/01.

2. Federal FY2002

- Federal appropriation, secured through the support of the New Mexico delegation, provided \$350,000 as a base funding line to NPS;
- NPS placed the base funding and the Institute lead responsibility under the Associate Director for Natural Resources Stewardship and Science, within the GRD program;
- New Mexico state legislature again provided \$350,000 to NM Tech as a non-federal match towards their FY02-FY03;
- The State of New Mexico also appropriated \$1M to the City of Carlsbad for the Institute building.
- The City of Carlsbad promised \$1.3M of in-kind services and cash.

3. Federal FY 2003

- \$350,000 from State of New Mexico through NM Tech operating funds
- \$342,000 from Federal appropriation for NPS base operating funds minus adjustments
- \$2M Federal appropriation to NPS construction funds as a "pass-through" to the City of Carlsbad for the headquarters building (reduced to \$1,956,900 by federal recessions).
- State of New Mexico appropriated \$350,000 to assist city with their \$1.3M in-kind promise
- New Mexico State University provided \$46,000 in-kind office space and support.
- ~\$30,000 estimated donations and in-kind matches from a variety of sources

4. PROJECTED FY 2004 AND 2005 FUNDING (PER YEAR)

- ~\$342,000 NPS Base Funding
- \$342,000 State of New Mexico through NM Tech
- \$46,000 New Mexico State University in-kind office space and support
- Unknown Donations & in-kind matches from a variety of sources
- Unknown Federal Matching Funds from other sources

5. MATCHING FUNDS REQUIREMENT

The enabling legislation requires that all federal funds (not just NPS appropriations) spent on Institute projects and programs be matched by a equal amount of non-federal funds, including state/local funding, grants, donations, or in-kind services provided by non-federal entities. In addition, fundraising efforts, including admission charges into a possible museum at the headquarters, also have the potential for a 100% federal match.

F. HEADQUARTERS BUILDING

1. HISTORY

The 2003 Memorandum of Agreement signed between The National Park Service, the New Mexico Institute of Mining and Technology, and the City of Carlsbad addresses funding and in-kind matching funds for an ~20,000 ft² building to include an outreach center, laboratories, library, and offices for the Institute. The Institute's primary partners selected the Architect and Engineering team of Durham & Associates and Studio D Architects in May 2003 to design and construct the building on land adjacent to the Pecos River in Carlsbad. The NPS has appropriated \$1,956,900 to partially match the \$2.3 million put up by the State of New Mexico and the City of Carlsbad.

2. CURRENT STATUS

Development of the site, part of a riverfront redevelopment project designed to attract tourism and owned by the city, will begin in Fall 2003. The A&E team expects that design will also begin in Fall 2003, and last approximately one year. Construction will take ~18 months with building completion possible by late 2005.

3. PROJECTED ACTIVITIES

The city continues seeking an additional \$343,100 federal fund match for the building. While construction costs would be covered by the ~\$4.5 million, no funding exists for museum exhibits or laboratories. It is anticipated that the design, fabrication, and installation of high quality exhibits will require approximately \$1.5 million and another \$1 million would be needed to outfit the laboratories. Currently, fundraising alternatives are being explored for a one-time capital campaign or in-kind donations of appropriate exhibits and/or laboratory equipment.

III. OPERATIONS: WHAT WILL THE INSTITUTE DO?

A. INTRODUCTION

The purposes set out in the enabling act leave plenty of latitude for interpretation and the Institute faces fundamental questions in all aspects of its operations. Among these uncertainties are:

- Does “to further the science of speleology” suggest that the Institute will undertake active, in-house research projects? Similarly, what is the appropriate role for the Institute relative to centralized “information” management, or to promoting and developing “public education”, or “sustainable resource management practices”?
- Should the Institute limit itself to facilitating and supporting efforts by other organizations already involved in these areas?
- Should the Institute lead efforts and, if so, in which program areas? Or, should it join or organize collaborative leadership efforts?
- Are its purposes best served by supporting other responsible leaders in the field?
- Should the Institute attempt to do all these things?

The City of Carlsbad and the Institute Director have begun preliminary design work on the Institute headquarters. Effective design efforts require a clear vision of the activities the Institute might undertake over the next 20 years. As the design phase progresses over the next six months, the Institute must make decisions on the future building uses based on anticipated operational goals and policies.

The following section provides a more detailed discussion exploring the potential of each of the legislatively mandated purposes and suggesting issues for participants to think about prior to the vision-building workshop.

B. NATIONAL CAVE AND KARST RESEARCH INSTITUTE PURPOSES AND MISSION

1. RESEARCH

Most members of the cave and karst community seem to agree on four possible research-related roles for the National Cave and Karst Research Institute. It should:

- Serve as a clearinghouse for information on all aspects of cave and karst studies and management, gathering information such as lists of resources and contact information for specialists that can help solve problems, facilitate research and education programs, and provide expertise;
- Work towards improving communication and collaboration between the various disciplines (geology, hydrology, biology, meteorology, etc.) by facilitating collaborative efforts between researchers associated with governmental, academic, non-profit, and industrial entities;
- Advocate the importance of research on cave/karst issues and raise the national/international consciousness concerning cave/karst research;
- Provide a strong voice towards identifying and rallying support for research into common problems and issues.

Some community members suggest that the title “Research Institute” calls upon the Institute to provide leadership in scientific research by developing a staff or network of scientists engaged in research. The Institute may provide the opportunity to pursue “big science” research projects previously unavailable to this community as the United States has lacked a robust cave and karst research center with a critical mass of scientists and PhD graduate students, the usual requisites for major scientific research programs. The Institute might also provide support and infrastructure for some of the excellent, independent (i.e.,

without professional affiliations) researchers in the cave/karst community, allowing them to more effectively contribute to the field.

Other community members have indicated reservations towards an active research program, suggesting that the Institute should not compete with established academic programs for research funds and that directing limited financial resources towards active research may dilute the impact the Institute's support towards applied resource management and education programs. Some also note that the placement of the Institute within the National Park Service, rather than the US Geological Survey, indicates Congressional emphasis on program areas other than research.

If the Institute develops an active research agenda, where should it set the program's parameters? Successful fund-raising would likely determine the specific research programs the Institute might undertake. However, mission clarity will assist in successful grant-writing and fund solicitation.

Issues to consider:

- How should the Institute serve as a clearinghouse for information on all aspects related to caves and karst?
- How should the Institute improve communication between disciplines and between researchers?
- Should the Institute have an active research program?
- Should the Institute explore fundamental questions on broad problems and issues, avoiding applied research that might present competition to private consultants?
- Should it develop a public-service, applied program to assist governmental land managers and private landowners who would otherwise not have the resources to address environmental concerns on their lands?

2. STANDARDIZE AND CENTRALIZE SPELEOLOGICAL INFORMATION

The Act directs the Institute to "centralize and standardize speleological information". This statement seems to suggest active participation and even leadership, beyond mere coordination. The Institute has already joined the U.S. Geological Survey in developing a national karst map that will be publicly available on an Institute website. Clarifying the Institute's agenda towards information management has important implications on the current building design effort.

Issues to consider:

- What type of projects will fulfill the mission to centralize and standardize speleological information?
- Should the Institute strive to assemble a world-class cave/karst library?
- Should it archive other materials, such as geologic and biological samples or historical documents?
- What sort of electronic databases should it develop and how will the information be shared?
- Should the Institute offer off-site storage of databases and other information for federal agencies, or others?
- How should the Institute's headquarters building be designed to house such information?

3. EDUCATION

The Institute's potential education mission can be divided into two categories: Formal and informal education programs. How the Institute will address its research mission clearly ties to how it might address public education. Whether the Institute will develop and lead new initiatives or limit itself to supporting other programs remains undetermined.

a. FORMAL EDUCATION

National research institutes commonly provide supervision and office, laboratory, and financial support for post-doctoral research associates, graduate students working on theses, and undergraduate student internships. These activities, however, would depend on the Institute pursuing an active research program. While the Institute might provide financial support to students and post-doctoral researchers, there are currently no suggestions where the Institute would raise significant money for this support if it does not pursue its own research agenda and, hence, funding. The Institute might also provide seminar series, course curricula development, and distance-learning and summer courses to serve scientists, educators, and students, either by supporting other institutions or building collaborative efforts with its partners. (The Institute has already provided some financial support for a master's degree in resource management at Western Kentucky University.)

Developing strategies to effectively enhance formal kindergarten through 12th grade education on cave/karst issues has proven challenging in this time of state-mandated standards and rigid curriculum guidelines, particularly when approached from a national level. In addition, classroom materials and teacher training seminars developed in one part of the country (e.g., east of the Mississippi River) commonly provide information and examples lacking pertinence to students and teachers living in another area (e.g., Hawaii or New Mexico). Institute K-12 efforts might include helping transfer successful programs from one part of the country to another part, one state to another state, and developing or supporting the development of new materials.

b. INFORMAL EDUCATION

As a national research center, the Institute appears well-placed to pursue an active public outreach program. Its title and affiliation with the National Park Service, an organization with high credibility in the arena of informal education, allows the Institute to easily capitalize on educational opportunities in informal, public forums. Already, the Institute has fielded many calls and e-mails from the media concerning cave and karst issues. Currently, the Institute staff and volunteer scientists are providing expertise and on-site talent to an international television production team making a science documentary on a cave ecosystem.

Issues to consider:

- Should the Institute serve as an active participant and leader in cave and karst education, or merely facilitate and coordinate other established educational programs nationwide?
- How should the Institute help transfer successful programs from one part of the country to another part, one state to another state?
- How might it develop or support the development of new materials and new curricula?
- How should the Institute develop informal educational opportunities?

4. PROMOTING ENVIRONMENTALLY SOUND MANAGEMENT PRACTICES

The last two (of the six) purposes listed in the enabling legislation, as well as extensive discussions in the Final Report to Congress, relate to promoting good resource management practices. Some cave-karst community members suggest that Congress' identification of the NPS as a key player in the Institute signifies that the Institute's primary (core) mission is to promote and support sound and sustainable stewardship of cave and karst resources, particularly on public lands. However, to date, few have suggested that the Institute be directly involved with resource management or land management decisions. Thus, most interpretations have recommended that these mandated purposes be carried out through the other missions of the Institute: Research, education, and information management. The question of whether serving the needs of federal/state/private land managers should carry primary influence over all Institute activities, or constitute only one component of its purpose, bears on every aspect of this discussion.

Issues to consider:

- Is promoting environmentally sound management practices a primary or core directive to all Institute activities?
- How will the Institute act as an advocate for good management practices?
- Does the NPS's role in administering the Institute limit its ability to "advocate"?
- Should the Institute provide in-house expertise on resource management issues to land owners/managers? If so, how would this effort relate to agency experts, and might this effort conflict with private consultants?
- Where can the federal cave management specialists for the various agencies most effectively function? Should they be housed in the multi-disciplinary, research and education oriented Institute?

5. WORKING GROUP RECOMMENDATIONS

The Federal Working Group addressed future operational issues by drafting a mission statement, which reads:

"The National Cave and Karst Research Institute facilitates speleological research, enhances public education, and promotes environmentally sound cave and karst management."

They also proposed to refine the legislatively mandated purposes into the following goals:

- Further the science of speleology through coordination and facilitation of research;
- Provide a point-of-contact for dealing with cave and karst issues by providing analysis and synthesis of speleological information and serving as a repository of information;
- Foster partnerships and cooperation in cave and karst research, education, and management programs;
- Promote and conduct cave and karst educational programs;
- Promote national and international cooperation in protecting the environment for the benefit of caves and karst landforms and systems;
- Develop and promote environmentally sound and sustainable cave and karst management practices, and provide information for applying these practices.

IV. ORGANIZATIONAL STRUCTURE: HOW WILL THE INSTITUTE DO IT?

A. INTRODUCTION

The enabling legislation addresses the Institute's administrative structure by stating that:

"The Institute shall be jointly administered by the National Park Service and a public or private agency, organization, or institution...." and it "be operated and managed in accordance with" the Report to Congress.

The Report's executive summary suggests that the:

"Institute would be jointly administered by the National Park Service and another entity - probably academic in nature....The National Park Service would have ultimate responsibility for the Institute, and would retain indirect control over its activities and programs. The academic entity would plan, coordinate, and administer the Institute and its programs."

Implementing these directives towards the administrative structure has resulted in one of the Institute's greatest challenges during its establishment phase. The additional parameter that at least one-half of the Institute funding must come from non-federal sources provides a further challenge to designing an effective administrative structure to meet the Institute's purposes.

The Institute's organizational structure also lacks clarity and the enabling legislation did not address the issue. The earlier Report to Congress recommended that the Institute be staffed by 17 full-time, mostly "active and experienced scientists rather than by people who are more administratively oriented" (Appendix F). Suggested staff positions were both tied to government GS/GM pay levels and recommended to "be competitive with academe", but the direct employer of the staff was not mentioned. The Director would promote the Institute, handle external contacts, and "gain funding". A Program Director/Chief Scientist would perform "Oversight and management of all operations and programs." Four Staff Scientists would constitute the next tier in the organizational chart. The Report anticipated equipped laboratories and field equipment. Federal appropriations to date are sufficient to fund only 2-3 staff positions.

Nearly a decade after the Report was written, the Interim Director and the Working Group developed an organizational structure that recommended three "coordinators" reporting to the Director and no staff scientists (Appendix G). The Working Group's proposed structure shows professionals as NPS employees. Partners, such as New Mexico Tech, would have independent, parallel programs with only a liaison relationship to the Institute shown on the organization chart. The Working Group effort did not develop a formal "joint management" mechanism, but the group envisioned working with a variety of partners.

The Interim Director, the Working Group, and the current Institute and GRD staff have searched for model research institutions. While most national research institutes involve collaborative efforts, commonly between federal agencies and academic entities, we have found no directly comparable analogue to the Institute's mandates. The Institute staff hopes that this vision-building workshop will provide additional insight towards the best manner to structure the Institute's ultimate organizational chart.

B. CURRENT ADMINISTRATIVE STRUCTURE

The NCKRI enabling act clearly directs the National Park Service to provide leadership in establishing the Institute and NPS currently designates the Geologic Resources Division (GRD) to act on that responsibility. The MOU acknowledges New Mexico Tech and the City of Carlsbad as active partners and advisors to the Institute, but the ultimate administrative responsibility currently lies solely with NPS-GRD. The Institute and its three primary partners continue to work towards a better definition of our mutual responsibilities towards each other. The future relationship will intimately entwine with the Institute's ultimate administrative and organizational structure.

C. CONSIDERATIONS SPECIFIC TO CONDUCT OF FEDERAL EMPLOYEES

In developing ideas for an organizational structure, workshop participants may want to consider some of the laws and policies that could apply to the conduct of federal employees. Applicability of these laws and policies will depend largely upon the Institute's final organizational structure. If the Institute remains primarily as a "federal" entity, then these laws and policies will govern the conduct of its federal employees. If the Institute becomes non-federal, e.g., non-profit 501c(3) entity, then application of these laws and policies will be limited, if applicable at all. Appendix I summarizes some of the most pertinent laws and policies that can apply to conduct of DOI/NPS employees.

D. MODELS

Established federally funded, national research institutes offer a plethora of models to ponder. While no such institute seems to completely match the needs of the Institute, the models summarized below offer insight into successful structures that provide the nation with important science research, education, and knowledge transfer services. Bullet lists of possible advantages and disadvantages of the models, as they might relate to the Institute's mission and needs, follow each discussion.

1. GOVERNMENT-GOVERNMENT INSTITUTES - LEOPOLD WILDERNESS RESEARCH INSTITUTE

The Aldo Leopold Wilderness Research Institute, an organization dedicated to understanding and management of wilderness, comprises a staff representing several federal agencies through an Interagency cooperative agreement between the USDA-Forest Service, Bureau of Land Management, National Park Service, US Fish and Wildlife Service, and the US Geological Survey. Located on the campus to the University of Montana, it also has developed collaborative and contracted projects with academic and private entities, which have been critical to the institute's research efforts. Collaborative and cooperative efforts with non-federal scientists include research projects, exchange programs, support of visiting experts, sponsorships of lectures, workshops, and symposia, and involvement in professional activities and societies.

The Leopold Institute looks at wilderness from a wide range of views including applied research, resource management, education, and outreach, and social, environmental, and ecological values. Scientists actively publishing in refereed journals make up much of the staff. A nearly year-long strategic planning process, touted as a model for interagency cooperation, set its goals and priorities.

The involved federal agencies contribute funding, which applies to research to develop knowledge needed to protect wilderness. An Interagency Wilderness Steering Committee provides oversight and a broad, national, strategic direction to the Institute. Two members of each agency make up the Committee, which meets twice a year.

Positive Attributes:

- Addresses many of the Report to Congress recommendations in its focus on applied and practical research, knowledge transfer, and sound resource management;
- Strong academic and diverse constituency involvement;
- Focuses solely on all aspects of research and management for a single type of natural resource;
- NPS's and Department of Interior's involvement with the Leopold model might make establishing the Institute administratively easier and quicker if it follows this model;
- Evolved through strategic planning and implementation phases that addressed many of the current questions facing the Institute.

Negative Attributes:

- Funded strictly through federal funds from participating land management agencies and does not have a mechanism to seek matching funds;
- Lacks a formal educational mission;
- Establishing a steering committee that excludes non-federal representation may not meet the mandate to be "jointly administered". Even if it does, it would likely discourage full-investment from non-federal partners;
- A stronger role for non-federal partners towards guiding Institute agendas and policies would likely assist in generating the necessary non-federal funds needed to operate the Institute;
- Many observers believe the Institute is mandated to extend beyond servicing the needs of federal land, environmental, and resource managers. If so, the decision-makers should, perhaps, come from a broader base than the Leopold model
- Relatively new and little tested or explored. It is unfamiliar to most members of the cave and karst community.

Further information on the Leopold Institute may be found at: <http://leopold.wilderness.net>

2. GOVERNMENT/UNIVERSITY PARTNERSHIP- COOPERATIVE ECOSYSTEMS STUDIES UNITS

The Report to Congress offered the NPS's *Cooperative Park Studies Unit* system as a model for the Institute. This cooperative program linked the National Park Service and various individual academic institutes. The program was phased out over the last five years and replaced by the similar but more broadly defined *Cooperative Ecosystem Studies Units* (CESUs). CESUs, established in 1998, organize around biogeographic areas, and link together into a nationwide network. Each CESU comprises several federal agencies, a host PhD-granting university, and partner institutions. The mission of a CESU is to provide high-quality research, technical assistance, and education to federal land, environmental, and resource

managers. The host institution is selected through a competitive Request For Proposal process. The 12 current CESUs involve 13 federal agencies, over 100 universities, colleges, and minority-serving institutions, and some non-profit groups.

As a participating federal agency, the NPS supplies partial baseline funding and at least one full-time coordinator (an established natural scientist with a PhD), who professionally resides on the host campus. Other, non-academic partners may also contribute to the baseline funding for the unit. The host campus provides office and laboratory space, an adjunct position to the NPS scientist, and faculty support to organize a network that works together providing better research, technical assistance, and educational projects of benefit and interest to Unit partners. Once a federal partner identifies a research need and funds become available from the agency or other supporters (non-profit groups, donations, etc.), academic units within the CESU network can receive task orders with minimal paperwork, allowing participants to minimize the usual delays and effort of the Request For Proposals procedures.

The CESU Council provides vision, coordinates activities, develops funding, and acts in a similar role to a board of directors in a non-governmental agency. Council membership is restricted to one representative from each participating federal agency and the CESU national coordinator, a contract employee of the NPS.

Positive Attributes:

- CESUs are closely analogous to the defunct CPSUs, which were cited in the Report to Congress;
- Closest Department of Interior model to the mandates of the Institute and, hence, provide a more comfortable concept to some federal employees involved with establishing the Institute;
- NPS's and other agency's experience with the CESU model might make establishing the Institute administratively easier and quicker if it follows this model;
- Existing CESUs have been highly successful in connecting academic researchers with land manager needs and in simply moving funds.
- Establishing the Institute in parallel with the CESU structure may provide mutualistic benefits to this innovative structure for conducting federal business.

Negative Attributes:

- Establishing a governing council that excludes non-federal representation, as the current CESUs, may not meet the mandate to be "jointly administered" and would likely discourage full-investment from non-federal partners;
- A stronger role for non-federal partners towards guiding Institute agendas and policies would likely assist in generating the necessary non-federal funds needed to operate the Institute;

- Many observers believe the Institute is mandated to extend beyond servicing the needs of federal land, environmental, and resource managers. If so, a broader based model than the current CESUs would need to be developed;
- CESUs are regionally focused while the Institute is thematic and carries a national and international mandate;
- Relatively new and little tested or explored. The CESU model is unfamiliar to most members of the cave and karst community;
- The Act requires the Institute to be located in or near Carlsbad, New Mexico. Currently, no academic institute in this area matches the requirements of a CESU host institution.

Further information on the CESU network may be found at: www.cesu.org/cesu

3. GOVERNMENT-OWNED/CONTRACTOR-OPERATED (“GOCOS”)

Several principal participants in drafting and lobbying for the Institute’s enabling legislation envisioned that the Institute would resemble *government-owned/contractor-operated* (GOCO) national research institutes and laboratories. The City of Carlsbad and State of New Mexico have a long history and comfort with these entities. Sandia and Los Alamos National Laboratories have sites in Carlsbad. New Mexico Tech administers the Very Large Array near their campus.

The federal government typically provides all funding for GOCOs. While no Department of Interior GOCOs currently exists, the Departments of Defense and Energy as well as the National Science Foundation make extensive use of this model. Federal agencies funding GOCOs maintain indirect control. Agencies commonly station some of their employees on site to provide oversight and/or to pursue the institute’s mission along side the contracted workers. Contractors include single PhD-granting universities, coalitions of universities, for-profit companies, and non-profit organizations.

Positive Attributes:

- Well-established model for federally funded research institutions with a long history of success within a variety of federal departments;
- Well-understood and comfortable to many academic and industrial researchers and to Institute supporters in its “home” state of New Mexico;
- Thematic, not geographically based. Some GOCOs have geographically distributed sites;
- Addresses the guidelines that the NPS “have ultimate responsibility” and “indirect control” (at least of the federally funded portion of the Institute) while allowing the contractor to “plan, coordinate, and administer the Institute and its programs”;
- Provides a strong administrative role to a non-federal entity, which would likely strengthen the Institute’s ability to raise non-federal funds;

- The Report to Congress cites the Los Alamos National Laboratory in the management section, suggesting recognition of GOCOs as similar entities to the proposed Institute.

Negative Attributes:

- Model is markedly different from the CPSU model suggested in the Report to Congress. The Report refers to use of a “cooperative management model” and a Cooperative Agreement (CA) in establishing the Institute. It does not discuss the potential use of a contract, which has significantly different legal distinctions from a CA. It also dismisses "lead oversight by a private foundation or an academic entity";
- The Department of Interior has no experience with this model and no established constituency supporting its implementation;
- Although educational mandates have been added to the COGO’s agendas, these institutes do not demonstrate a long history or tradition in this field;
- Relinquishing day-to-day management of the Institute to a non-federal entity might diminish attention and the dedication of resources to federal land management issues;
- We are not aware of any COGOs, past or present, that focused on resource or land management issues;
- To our knowledge, no COGO has ever addressed the Institute’s requirement to raise at least 50% of its funding from non-federal sources. Most operate entirely on federal funds.

Further information on government owned/contractor operated research institutes may be found at: <http://www.nsf.gov/sbe/srs/nsf02317/indffrdc.htm#snl>

4. SCIENCE AND TECHNOLOGY CENTERS

The National Science Foundation (NSF - a federal government funding agency) has supported and overseen the establishment of more than 30 *Science and Technology Centers* (STCs) during the last dozen years. These centers for research, education, and knowledge transfer match many of the Institute’s mandates. STCs typically have 3-8 PhD-granting institutes as primary partners, including a lead institution. The lead institution has ultimate responsibility for planning, operating, and managing the STC, but an NSF program director oversees the program. The lead university receives and administers the NSF (federal) funds, providing sub-contracts to support STC’s activities at other partner institutions. STCs must have a broad spectrum of partners including non-PhD universities and colleges, governmental groups (federal, state, and local), national laboratories, non-profit organizations, and industry. STCs are required to assemble a prestigious advisory board of top people in the field from non-partner organizations.

While NSF requires the director of each center to hold an academic appointment at the host university, programs and staff may be employed by partner institutions (Appendix H). For example, the Director works at host University A while the Associate Director for Education (the STC program requires this position) works at University B, the Associate Director for Research is employed by University C, and the Associate Director for Knowledge Transfer might be an NPS employee. The STC may have a physical home or may operate out of offices and laboratories at a variety of institutions. STCs are required to match 1/3 of their NSF funding with money and in-kind services from non-federal sources. Other federal funds (such as NPS grants) received by the STC neither provide a match to NSF funds nor have to be matched by non-federal funds (at least, under NSF requirements).

The NSF program provides relatively generous funding to these institutes, approximately \$4 million per year for 10 years. NSF then expects the STCs to continue their work supported by other funding sources. The Southern California Earthquake Center provides an interesting example of a “graduated” STC. One of the earliest STCs, the robust Center now operates on a combination of grants from the US Geological Survey, State of California, utility companies, fund-raising efforts, and NSF grants from a different program. The US Geological Survey runs a closely affiliated earthquake center with federal employees.

Positive Attributes:

- The program has successfully operated for more than a decade;
- Focus on research, education, and knowledge transfer matches the Institute’s mandates;
- Operates through broad coalitions incorporating every aspect of the discipline’s constituency, including government, academe, non-profits, and industry;
- Matching fund requirement, albeit only 30% of the Institute’s non-federal funding requirement;
- Discipline-focused, not regional. STCs typically operate programs at a wide variety of venues;
- Addresses the guidelines that the NPS “have ultimate responsibility” and “indirect control” (at least of the federally funded portion of the Institute) while allowing the Principal Investigator/STC Director to “plan, coordinate, and administer the Institute and its programs” in consultation with the partner institutes and the advisory board;
- This approach provides a strong administrative role to a non-federal entity and would likely strength the Institute’s ability to raise non-federal funds.

Negative Attributes:

- The STC model is markedly different from the CPSU model suggested in the Report to Congress;
- The Department of Interior has no experience with this model and no established constituency supporting its implementation;
- No STC has ever focused on resource or land management issues;

- Relinquishing day-to-day management of the Institute to a non-federal entity might diminish attention and the dedication of resources to federal land management issues.

Further information on Science and Technology Centers may be found at:

<http://www.nsf.gov/od/oia/programs/stc/centers.htm>

V. LIST OF APPENDICES

- A. Federal Cave Resources Protection Act of 1988
- B. Public Law 101-578
- C. Executive summary of NCKRI study report to Congress
- D. Enabling legislation - National Cave and Karst Research Act of 1998
- E. Memorandum of Understanding between primary partners
- F. Organization chart described by the Report to Congress
- G. Organization chart proposed by Federal Working Group
- H. Organization chart for SAHRA, an NSF-STC
- I. Selected laws and policies that apply to the conduct of DOI/NPS employees
- J. Letters from stakeholders